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## **Shipboard LADCP/ $\chi$ pod Profiling of Internal Wave Structure and Dissipation in the Luzon Strait**

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### **LONG-TERM GOALS**

We seek a more complete and fundamental understanding of the hierarchy of processes which transfer energy and momentum from large scales, feed the internal wavefield, and ultimately dissipate through turbulence. This cascade impacts the acoustic, optical, and biogeochemical properties of the water column, and feeds back to alter the larger scale circulation. Studies within the **Ocean Mixing Group** at OSU emphasize observations, innovative sensor / instrumentation development and integration, and process-oriented internal wave and turbulence modeling for interpretation.

### **OBJECTIVES**

Luzon Strait represents a major source of internal tides and NLIWs in the SCS. However, unlike other regions of strong internal wave generation (i.e., Hawaii), Luzon Strait is believed to be highly dissipative. We seek to understand the character of this enhanced nonlinearity and turbulence, and how it affects the process of wave generation. Specifically, we intend to:

- identify hotspots of generation and dissipation,
- quantify the structure and variability of wave energy, its flux and dissipation at the generation site.
- define the broader spatial structure, temporal content, and energetics of the internal wave field, and
- understand connections between Kuroshio influences and wave generation
- clarify the partitioning of topography, mesoscale variability and near-inertial motions on internal tide generation and dissipation.

### **APPROACH**

To accomplish the above objectives, we will:

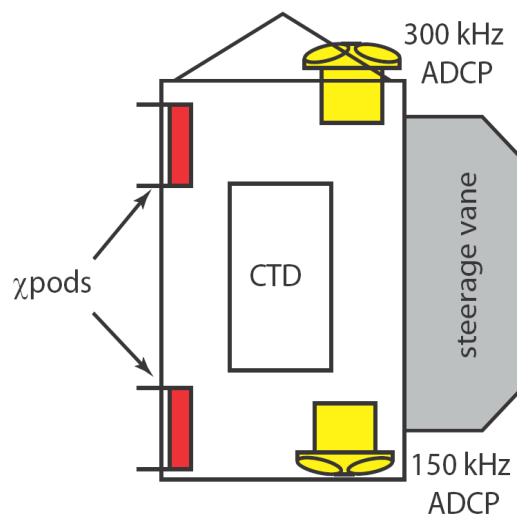
1. add self-contained  $\chi$  pods (Moum and Nash, 2009) with full motion packages to our 3000-m capable LADCP/CTD system (Figure 3) in order to measure the dissipation rates of temperature variance ( $\square$ ) and TKE ( $\square$ ).
2. use this LADCP/ $\chi$ pod system to investigate the generation of internal waves, NLIWs, bores and their associated dissipation within Luzon Strait.

This system will be especially useful at obtaining rapid profiles of near-bottom velocity, density and turbulence at deep (1000-2000 m) locations.

In addition, if our DURIP (submitted September 2009) is funded, we will deploy a full water-column mooring at the central ridge crest to help ground the larger experiment.

## WORK COMPLETED

This project has just begun. We are in the process of constructing deep (high-pressure)  $\chi$  pods and other components to be attached to the shipboard CTD.



**Figure 3 – schematic of proposed  $\chi$ pod/LADCP to provide turbulence and internal wave density & velocity over the full water column (down to 3000 m). Two  $\chi$  pods will be attached to the leading edge of a vaned CTD cage to profile turbulence. Upward- and downward-looking ADCPs (300 and 150 kHz) will capture the detailed velocity structure of linear and nonlinear internal waves and bores. Full motion packages will be used to compensate for CTD package motion.**

## REFERENCES

Moum, J.N. and J.D. Nash, 2009: Mixing measurements on an equatorial ocean mooring, *J. Atmos. and Oceanic Tech.*, 26, 317-336